



STATE OF UTAH  
NATURAL RESOURCES  
Oil, Gas & Mining

*Mining file*

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April 29, 1987

Mr. W.L. Jackson  
Manager, Laboratory and  
Environmental Affairs  
AMAX Magnesium  
238 North 23200 West  
Salt Lake City, Utah 84116

Dear Mr. Jackson

Re: Technical Review of MR-1 Application, Mining and Reclamation  
Plan, Knolls Solar Evaporation Pond System, M/045/022,  
Tooele County, Utah

The Division has completed its review of your mining and Reclamation Plan received March 25, 1987. While the proposed project is conceptually acceptable to the Division, several areas of the application contain insufficient information and detail for the Division to proceed toward tentative approval.

The following comments identify the specific areas of concern which must be addressed before the permitting process can continue.

#### VARIANCE REQUESTS

##### Rule M-10(10) Shafts and Portals

The Division may only grant a variance to a reclamation standard when the site specific conditions surrounding such occurrences are known and adequate justification, or mitigation is provided. Since no shafts or portals are known to exist onsite or proposed in the plan, the applicant is not required to address this portion of the regulations. No variance is required.

##### Rule M-10(5) Slopes

The applicant has indicated that no areas will require sloping, and based, on our review of plans submitted, the Division concurs. No further information is required; the need for a variance is negated.



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Rule M-10(11) Sediment Control

The application states: "A variance is requested from this provision, as this operation does not generate sediment, in this sense". AMAX has committed to undertake sediment and erosion control measures as outlined on page 62 and page 63 of the Draft Environmental Assessment submitted with your permit application. The request for variance is therefore denied.

Rule M-10(12) Revegetation & Rule M-10(14) Soils

The Division concurs with AMAX that those areas exhibiting less than five percent existing vegetative cover density will not require stockpiling of topsoil and revegetation. However, prior to granting a variance from these rules, the Division requires that those areas with greater than five percent cover be delineated on a map of suitable scale. As per recent discussions with Division staff, additional variance requests must be formally requested as outlined on page 11 of the MR-1 application.

Rule M-10(12) Dams

A variance from reclaiming all project dikes is denied. Through meetings and correspondence between the Bureau of Land Management (BLM) and AMAX Magnesium, the Division's understanding of dike reclamation is as follows:

The BLM wishes to defer final reclamation requirements until the termination of operations in order to properly assess whether the project dikes will provide a viable postmining function.

The Division concurs that certain dikes may provide access and protection for a valuable postmining mineral deposit. However, because the need for the dikes to perform a viable postmining function is unknown at present, the Division has assumed a "worst case" situation for the calculation of a reclamation surety estimate.

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The "worst case" situation is based on joint agreement between the Division and the BLM of the maximum reclamation work to be required at the termination of mining activities. Final reclamation requirements for the dikes will be determined in a final reclamation plan to be approved by both the Division and the BLM at the time of project termination.

Given this understanding, dike reclamation will consist of the following work:

- 1) All interior dikes will be knocked down and graded flat.
- 2) Exterior dikes will be breached in numerous locations to allow for free surface drainage and restrict non-essential vehicular use.
- 3) Exterior dikes will be graded by rounding the tops of the dikes to reduce visual impact and discourage nonessential vehicular use.

#### Item 17, page 5 - Permit Term

Unless advised otherwise, the Division will escalate the calculated surety amount (in 1987 dollars) by a fixed percentage over the projected 20 year mine life to obtain the required sum in 2007 dollars (refer to attached estimate).

#### General Comments

Many items are answered by referring the reader to the draft Environmental Assessment (EA). While these recommendations may be acceptable reclamation practices, they are simply recommendations and cannot be considered a plan of reclamation committed to by the operator. Please outline the specific reclamation practices AMAX proposes to undertake and/or provide a commitment to reclaim as outlined in the draft EA. The reclamation plan should include discussions of the following major areas of concern:

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- 1) inlet canal reclamation,
- 2) dike reclamation (interior and exterior),
- 3) structure removal (pumps, pads, foundations, buildings, etc.),
- 4) borrow area reclamation (within the permit area), and
- 5) access and haul road reclamation.

#### Page 12 - Confidentiality

The applicant has indicated that confidential information relating to the location, size, or nature of the deposit is enclosed with the application. Please identify the material you wish to have protected as classified so that we may secure it in a separate file.

#### Draft EA, pages 60-64 - Revegetation Recommendations

While the Division agrees with the majority of the recommendations, the following comments are included for your information and use:

- 1) Seeding - The rangeland drill should be the primary tool for reseeding this area. Seeds should be planted 1/2 inch deep.
- 2) Mulching - Most mulching is done with a mechanical mulcher which chops hay or straw and blows it out over the soil. If this is done, there is no stem left to "crimp". Therefore, it is usually better to blow the mulch on first, then drill the seed, thus letting the drill incorporate much of the mulch into the soil.
- 3) Seed mixture - While the proposed seed mixture is satisfactory, it would be well to add two lbs./acre of shadscale and one lb/acre of small rabbitbrush. The area is primarily shrub covered and these species may hold on better than grasses.

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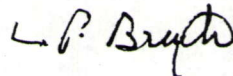
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- 4) Fertilizer - No mention is made of fertilizer. It would be desirable to put on 200 lbs/acre of diammonium phosphate 18-46-0 at the time of seeding.

Thank you for your cooperation in this permitting matter. Should you have questions or concerns, please contact me or David Wham.

Sincerely,



L. P. Braxton  
Administrator  
Mineral Resource Development  
and Reclamation Program

DMW:clj

Enclosures

cc: H. Hedrick, BLM, Pony Express R.A.

F. Filas

F. Jensen

D. Wham

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DETAILS OF BOND ESTIMATE  
AMAX KNOLLS PROJECT - M/043/022

A. Reclaim Clay Borrow Areas - Approximately 40% of Borrow Pits #5 and #6 will be above the projected salt line and will require reclamation. All of Borrow Pit #4 will require reclamation.

1. Grade and contour borrow area

Given: Area above salt line = 656 acres

Assume: Limited grading required  
D-8 at 1 acre/hour

Result: 656 hours \$ 94,000

2. Move and place soil material

Given: 1,000 cubic yards soil material  
Average haul distance = 900 feet

Assume: 20% of material moved by D-8 at 400 cubic yards per hour and 80% of material moved by 34 cubic yard scraper at 280 cubic yards per hour.

Result: 500 hours D-8 \$ 71,700  
2857 hours 633D 599,100  
\$ 670,800

3. Grade and rip soil

Given: 656 acres of borrow area  
340 acres of topsoil and waste storage

Assume: 250 HP motor grader with multishank ripper at  
.75 acres per hour

Result: 1328 hours \$ 179,400

4. Seed, fertilize, and scarify

Given: 996 acres  
Seed = approximately \$200 per acre  
Fertilizer = approximately \$40 per acre



Reclamation Bond Estimate  
AMAX KNOLLS PROJECT, M/045/022

ITEM	Cost
Reclaim Borrow Areas	\$1,268,400
Reclaim Haul Roads	63,900
Backfill Canals	150,200
Dike Reclamation	27,100
Reclaim Surface Facilities	<u>64,500</u>
TOTAL	\$1,574,100

INFLATION AT 2% PER YEAR

Year	
1987	\$1,574,100
1988(1)	1,605,600
1989(2)	1,637,700
1990(3)	1,670,400
1991(4)	1,703,900
1992(5)	1,737,900
1997(10)	1,918,800
2002(15)	2,118,500
2007(20)	2,339,000

Note: The Permit Holder can bond for any period of time. The Division usually recommends a five year bond period.

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### EQUIPMENT AND LABOR COSTS

Item	\$Cost/Hr.*
Laborer	\$ 23.65
Equipment Operator	30.35
Foreman	33.65
34 Cy Scraper	179.34
250 HP Motor Grader	98.23
with ripper	104.76
D8 Bulldozer	112.98
with ripper	119.39
Tractor and Drill Seeder	33.83
3 CY Wheel Loader	53.38
25 Ton Hyd. Crane	56.00
Tractor Trailer	33.43

\*Labor costs include benefits and contractors' profit. Equipment costs reflect current rental rate plus operating cost. Costs are based on the monthly rates listed in the "Rental Rate Blue Book" and the "1987 Means Site Work Cost Data".

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Assume: Farm tractor with drill seeder at .75 acres per hour

Result:	1328 hours	\$ 85,200
	Seed, fertilizer	239,000
		<u>\$ 324,200</u>

Total Borrow Area Costs

1.	Grade and contour	\$ 94,000
2.	Place topsoil	670,800
3.	Fine grade and rip	179,400
4.	Seed and scarify	324,200
		<u>\$1,268,400</u>

B. Haul Road Reclamation

1. Rip and grade down haul roads west of existing BLM road

Given: 24,000 linear feet of road  
4.2 cubic yards of compacted road material (per linear foot of road to be pushed and leveled an average distance of 30 feet)

Assume: D-8 dozer with ripper at 470 cubic yards per hour

Result:	213 hours	\$ 31,900
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2. Spread soil material

Given: 35,600 cubic yards of material over a 50 foot push

Assume: D-8 dozer will push and level 550 cubic yards per hour

Result:	67 hours	\$ 9,600
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3. Grade haul road areas

Given: Disturbed area  
80 feet by 24,00 feet = 44 acres

Assume: 250 HP grader with ripper at .75 acres per hour

Result:	59 hours	\$ 8,000
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4. Drill seed

Given: 44 acres

Assume: Tractor with drill seeder at .75 acres per hour

Result:	59 hours	\$ 3,800
	Seed, fertilizer	10,600
		<u>\$ 14,400</u>

Total Haul Road Reclamation Costs

1.	Grade and level	\$ 31,900
2.	Place topsoil	9,600
3.	Grade and rip	8,000
4.	Drill seed	14,400
		<u>\$ 63,900</u>
		\$ 1,450 per acre

C. Backfill Canals

1. Main inlet canal

a. Backfill and level

Given: Average depth of eight feet  
Approximately 28,500 linear feet of canal  
Approximately 540,000 cubic yards of material  
with average push of 75 feet

Assume: D-8 dozer will push and level 730 cubic yards  
per hour

Result: 740 hours \$ 106,100

b. Grade canal area

Given: Disturbed area  
80 feet by 28,500 feet = 52 acres

Assume: 250 HP grader at .75 acres per hour

Result: 69 hours \$ 8,900



2. No. 2 pump feed canal

a. Backfill and level

Given: Average depth of eight feet  
Approximately 8600 linear feet of canal  
Approximately 86,000 cubic yards of material  
with average push of 75 feet

Assume: D-8 dozer will push and level 730 cubic yards  
per hour

Result: 118 hours \$ 16,900

b. Grade canal area

Given: Disturbed area  
60 feet by 8600 feet = 12 acres

Assume: 250 HP grader at .75 acres per hour

Result: 16 hours \$ 2,100

3. No. 7a inlet canal

a. Push adjacent dikes over into canal area

Given: Push top three to four feet of dikes into  
canal area  
Two dikes are approximately 7500 feet long  
Approximately 45,000 cubic yards of compacted  
material to be pushed an average distance of  
50 feet

Assume: D-8 dozer with ripper will push and level 580  
cubic feet per hour

Result: 78 hours \$ 11,700

b. Grade canal area

Given: Disturbed area is approximately  
150 feet by 7500 feet = 26 acres

Assume: 250 HP motor grader at .75 acres per hour

Result: 35 hours \$ 4,500

Backfill Canals Total Cost

1.	Main Inlet Canal	\$ 115,000
2.	No. 2 Pump Feed Canal	19,000
3.	No. 7a Inlet Canal	16,200
		<u>\$ 150,200</u>

D. Round of Edges of Dikes and Breach as Required

1. Exterior dikes (Ponds 0-5) and saddle dams

Given: Approximately 100,000 linear feet of dikes

Assume: One pass with D-8 dozer on each side of dike at  
1,000 feet per hour  
Two passes with 250 HP grader on each side of  
dike at 2,000 feet per hour

2. Interior dikes, pond 7

Given: Approximately 100,000 linear feet of dike

Assume: Two passes with 250 HP grader at 2,000 feet per  
hour

Result: 50 hours \$ 6,400

Total Dike Reclamation

1.	Exterior dikes	\$ 20,700
2.	Interior dikes	6,400
		<u>\$ 27,100</u>

E. Reclaim Maintenance Building Area, Pump Stations, and Reservoir

1. Dismantle maintenance building area

a. Dismantle building and associated piping

Given: 3,500 square foot metal building



Assume: Will require crew as follows for one week to dismantle site: foreman, four laborers, two equipment operators, 25 ton hydraulic crane, and two tractor trailers

Result: 40 hours \$ 11,100

b. Break up and bury twelve foot concrete slab

Given: 3,500 square foot slab

Assume: Will require crew as follows for one week: foreman, two laborers, two equipment operators, 25 ton hydraulic crane, three cubic yard wheel loader

Result: 40 hours \$ 10,000

2. Dismantle pump stations

Given: Dismantle five pump stations, haul material off site, and push in sump areas

Assume: Will require following crew for two weeks: foreman, two laborers, two equipment operators, three cubic yard wheel loader, and two tractor trailers

Result: 80 hours \$ 21,000

3. Grade down maintenance building pad area and reservoir dikes

a. Push dikes and pads down, breach as necessary

Given: one acre pad area and 14,000 linear feet of reservoir dike

Assume: 50,000 cubic yards of compacted material has to be pushed and leveled. A dozer with ripper on a 100 foot push will average 480 cubic yards per hour.

Result: 104 hours \$ 15,600

b. Grade pushed material

Given: Grade approximately 40 acres

Assume: 250 HP motor grader at .75 acres per hour

Result: 53 hours \$ 6,800

Total Cost Reclaim Maintenance Building Area and Pump Stations

1.	Reclaim building area	\$ 21,100
2.	Dismantle pump stations	21,000
3.	Grade pad and reservoir	22,400
		<u>\$ 64,500</u>

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